HMT-HPC: Advancing the Prediction of Extreme Precipitation Events

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Extreme precipitation events occur as a result of meteorological phenomena as varied as warm season convection, atmospheric rivers (ARs), tropical cyclones, and midlatitude synoptic systems. Despite improvements in precipitation forecasts over the past several decades, the accurate prediction of extreme precipitation events remains a critical forecast challenge. As the national center responsible for providing quantitative precipitation forecast (QPF) guidance, NCEP's Hydrometeorological Prediction Center and the Hydrometeorologial Testbed at HPC (HMT-HPC) are uniquely positioned to play a leading role in advancing the prediction of extreme precipitation events.

To address this challenge, HMT-HPC has developed and conducted a series of forecasting experiments focused on improving the prediction of extreme precipitation events. The goal of these experiments is to bring the research and operational communities together to test new datasets in a pseudo-operational forecasting environment. In 2010 and 2011, HMT-HPC collaborated with the Hazardous Weather Testbed (HWT) to test the use of high resolution convection-allowing models and ensembles to improve warm season precipitation forecasts. More recently, HMT-HPC collaborated with scientists from the Earth Systems Research Laboratory (ESRL) to host the Atmospheric River Retrospective Forecasting Experiment (ARRFEX) in September 2012. This experiment focused on the challenges associated with forecasting precipitation associated with landfalling ARs, particularly maximum precipitation amounts and event timing.

The key impact of these experiments has been the implementation and use of convection-allowing models and ensembles in HPC operations. While previous work has laid the groundwork for improving the prediction of convectively-driven extreme precipitation events, significant challenges remain. To address these challenges, HMT-HPC is collaborating with the National Severe Storms Laboratory (NSSL) and the NOAA HMT to host an Intense Precipitation and Flash Flooding Experiment in July 2013. This new experiment will focus on the utility of convection-allowing models and ensembles for improving warm season precipitation forecasts while also using emerging hydrologic models to explore the connection between these forecasts and any resulting downstream flash flooding. This presentation will highlight the operational impacts of previous forecasting experiments as well as outline the goals of the upcoming Intense Precipitation and Flash Flooding Experiment.